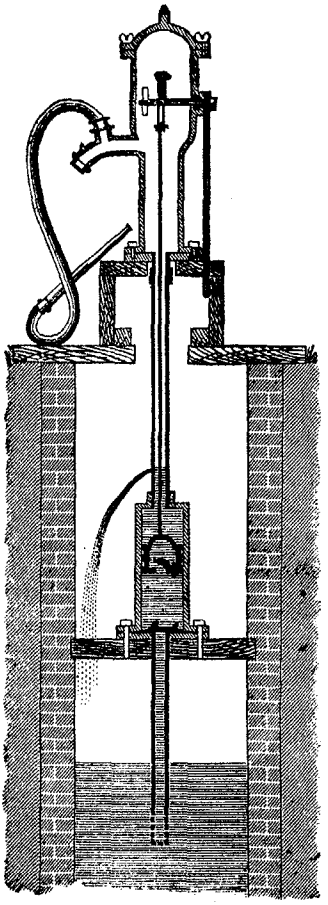
The assertion will be opposed by the repeated experience of every practical chemist.

The employment of hydrogen as a reducing agent for numerous metallic oxides is a matter constantly recurring in the laboratory, and this process, so far from taking place with explosive violence, on the contrary is often a tediously gradual one. The assertion, therefore, that hydrogen will produce so violent an action with iron oxide is unsupported by any fact known to the chemist, but is contrary to his almost every day experience.

While agreeing with the author that "the best judge of any science or art is a person who has made science or art his particular study," inquiring minds will be disposed to call for something more than mere statements to support even a theory as fascinating as his appears to be.



A Force and Lift Pump.—The accompanying figure represents a pump, manufactured by the American Pump Company, Philada., and exhibited at a late meeting of the Franklin Institute.

The pump for out-door work here represented, is secured to a plank or timber, and is connected by a pipe to the water to be lifted. The plunger rod is worked by a rocking shaft running through the side, instead of working, as ordinarily, through the top. The handle is attached to the outer end of shaft, thus permitting the top to be closed by a hinged lid, secured by thumb screws, and forming an air chamber. When this is off, the machine is a simple lift pump; when on, it is converted into a force pump, throwing a continuous stream with considerable force.

Problem of the Rafters.—Since the article on page 100 of the present volume of the *Journal* was published, I have found that Prof. Rankine, in his Civil Engineering article 179, page 292, has given the

correct formulas for this case. My formulas agree with his when the *notation* is so changed as to agree with each other. DE V. W.

Errata.—Page 104, second line from the bottom, for wxAB read wAB.

Page 106, second line from the bottom, the line bf referred to is not shown in Fig. 6.

Page 107, near the middle of the page in equation for compression, for Cos^2 read $Cos^2\theta$.

The Cost of Tunnelling.—The *London Times*, in a recent article, gives a tabulated statement of a number of the more important tunnelling enterprises, from which we learn that the cost per linear yard of the works below named were as given:

Mont Cenis, $975; the Kilsby, the Saltwood and the Bletchingley, the costliest of the English tunnels, cost $725, $590 and $360 respectively. That of Terre Noire (France) cost $475, and the Hoosac, in Massachusetts, has thus far averaged $940.

Adulteration of Aniline Colors.—The intense tinctorial power of the aniline dyes seems to offer irresistible temptation to dishonest dealers to imitate or adulterate them with worthless ingredients. A sample of fuchsine (an aniline red) lately placed in our hands by Dr. Genth was composed entirely of sugar crystals saturated with the coloring matter. To any one familiar with the peculiar arborescent appearance of the pure fuchsine particles, the sugar crystals, with their rhombic prisms, would betray the imposition at a glance; but without this knowledge the detection would be attended with some difficulty, since the color of both genuine and counterfeit samples is equally intense. One of the simplest methods to detect this and similar impositions is simply to digest a sample of the suspected substance in ether or absolute alcohol, when the coloring matter will be dissolved with ease, and the sugar, crystals, or wood fibre (which is also used for dishonest purposes) will remain undissolved.

Arsenic in Colored Carpetings.—Hallwachs* has found that not only green but also the red colored carpetings frequently contain arsenic. He particularly asserts that the brilliant dark red colors, now so greatly in demand, contain enormous quantities of this poisonous substance. The goods burned with the blue flame of arsenic, and gave its characteristic garlic odor. Enough of the color could be

* Gewerb. f. d. Grossh. Hessen., 169.